

1 **CLAIMS**

2 1. A method of serializing an object, the method comprising:

3 generating a data structure ("datastruct") element representative of a data
4 structure of a first object, the datastruct element having a pair of datastruct tags,
5 wherein the datastruct tags identify the datastruct element;

6 generating contents of the datastruct between the datastruct tags, the
7 contents comprising one or more data parameter elements representative of one or
8 more data parameters of the first object's data structure, each parameter element
9 having a pair of parameter tags associated therewith, wherein each pair of
10 parameter tags identifies a parameter element with which the pair of tags is
11 associated, each parameter element having associated data between the pair of
12 parameter tags.

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14 2. A method as recited in claim 1, wherein the contents further comprise
15 at least one object reference referencing a second object within the data structure
16 of the first object without including the second object within the contents of the
17 datastruct element.

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19 3. A method as recited in claim 2, wherein the second object is the first
20 object.

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22 4. A method as recited in claim 1, wherein the contents comprises a
23 datatype definition for at least one data parameter element.
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1 5. A method as recited in claim 1, wherein the contents comprises a
2 reference to a datatype definition for at least one data parameter element.

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4 6. A method as recited in claim 1, wherein at least one of the pair of
5 datastruct tags comprises a datatype definition for at least one data parameter
6 element.

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8 7. A method as recited in claim 1, wherein at least one of the pair of
9 datastruct tags comprises a reference to a datatype definition for at least one data
10 parameter element.

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12 8. A method as recited in claim 1, wherein at least one of a pair of
13 parameter tags comprises a datatype definition for associated data between the
14 parameter tags.

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16 9. A method as recited in claim 1, wherein at least one of a pair of
17 parameter tags comprises a reference to a datatype definition for associated data
18 between the parameter tags.

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20 10. A method as recited in claim 1, wherein the datastruct element and
21 its contents are encoded using XML.

1 11. A method as recited in claim 1 further comprising:

2 inserting the datastruct element into a message; and

3 sending the message to an entity on a network.

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5 12. A method as recited in claim 11 further comprising:

6 formatting the message for sending over a network using HTTP;

7 sending the message to an entity on the network by using HTTP.

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9 13. A method as recited in claim 11 further comprising:

10 binding the message into a HTTP request;

11 sending the message to an entity on the network by using HTTP.

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13 14. A method as recited in claim 1, wherein a data parameter element
14 has the following format:

15 <parameter_label> parameter_data </parameter_label>

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17 the <parameter_label> being one of the pair of parameter tags, the
18 </parameter_label> being the other of the pair of parameter tags, and the
19 parameter_label identifying the data parameter element;

20 the parameter_data being the data associated with the parameter element
21 identified by the parameter_label.

1 **15.** A computer-readable storage medium having computer-executable
2 instructions that, when executed by a computer, performs the method as recited in
3 claim 1.

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5 **16.** A method of serializing an object, the method comprising:
6 generating a data structure ("datastruct") element having a pair of datastruct
7 tags encoded in XML, wherein the datastruct tags identify the datastruct element;
8 generating contents of the datastruct between the datastruct tags, the
9 contents comprising one or more data parameter elements, each having a pair of
10 parameter tags associated therewith and encoded in XML, wherein each pair of
11 parameter tags identifies a parameter element with which the pair of tags is
12 associated, each parameter element having associated data between the parameter
13 tags.

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15 **17.** A method of serializing an object, the method comprising:
16 generating a data structure ("datastruct") element representative of a data
17 structure of a first object, the datastruct element having a pair of datastruct tags,
18 wherein the datastruct tags identify the datastruct element;
19 generating contents of the datastruct element between the datastruct tags,
20 the contents comprising at least one object reference referencing a second object
21 within the data structure of the first object without including the second object
22 within the contents of the datastruct element.

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1 **18.** A method as recited in claim 17, wherein the second object is the
2 first object.

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4 **19.** A method of exchanging a serialized object, the method comprising:
5 transmitting a message to an entity over a network;
6 the message comprising a serialized object comprising:

7 a data structure ("datastruct") element representative of a data
8 structure of an object, the datastruct element having a pair of datastruct
9 tags, wherein the datastruct tags identify the datastruct element;

10 contents of the datastruct between the datastruct tags, the contents
11 comprising one or more data parameter elements representative of one or
12 more data parameters of the object's data structure, each parameter element
13 having a pair of parameter tags associated therewith, wherein each pair of
14 parameter tags identifies a parameter element with which the pair of tags is
15 associated, each parameter element having associated data between the
16 parameter tags.

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18 **20.** A method as recited in claim 19, wherein the contents comprises a
19 datatype definition for at least one data parameter element.

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21 **21.** A method as recited in claim 19, wherein the contents comprises a
22 reference to a datatype definition for at least one data parameter element.
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1 **22.** A method as recited in claim 19, wherein at least one of the pair of
2 datastruct tags comprises a datatype definition for at least one data parameter
3 element.

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5 **23.** A method as recited in claim 19, wherein at least one of the pair of
6 datastruct tags comprises a reference to a datatype definition for at least one data
7 parameter element.

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9 **24.** A method as recited in claim 19, wherein the datastruct element and
10 its contents are encoded using XML.

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12 **25.** A method as recited in claim 19 further comprising, before the
13 transmitting, formatting the message for sending over a network using HTTP and
14 the transmitting employs HTTP to send the message over a network.

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16 **26.** A method as recited in claim 19, wherein a data parameter element
17 has the following format:

18 <parameter_label> parameter_data </parameter_label>
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20 the <parameter_label> being one of the pair of parameter tags, the
21 </parameter_label> being the other of the pair of parameter tags, and the
22 parameter_label identifying the data parameter element;

23 the parameter_data being the data associated with the parameter element
24 identified by the parameter_label.
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1 **29.** A deserialization method comprising:

2 parsing a message;

3 the message comprising a serialized object comprising:

4 a data structure ("datastruct") element representative of a data
5 structure of a first object, the datastruct element having a pair of datastruct
6 tags, wherein the datastruct tags identify the datastruct element;

7 contents of the datastruct between the datastruct tags, the contents
8 comprising one or more data parameter elements representative of one or
9 more data parameters of the object's data structure, each parameter element
10 having a pair of parameter tags associated therewith, wherein each pair of
11 parameter tags identifies a parameter element with which the pair of tags is
12 associated, each parameter element having associated data between the
13 parameter tags.

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15 **30.** A method as recited in claim 29 further comprising receiving the
16 message comprising a serialized object.

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18 **31.** A method as recited in claim 29, further comprising:

19 generating a second object having the same data structure as the first object,
20 wherein the data structure of the second object is based upon the datastruct
21 element and its contents;

22 inserting data associated with each parameter element into the second
23 object.

1 39. A method as recited in claim 29, wherein a data parameter element
2 has the following format:

3 <parameter_label> *parameter_data* </parameter_label>
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5 the <parameter_label> being one of the pair of parameter tags, the
6 </parameter_label> being the other of the pair of parameter tags, and the
7 parameter_label identifying the data parameter element;

8 the parameter_data being the data associated with the parameter element
9 identified by the parameter_label.
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1 **40.** A computer-readable storage medium having computer-executable
2 instructions that, when executed by a computer, performs the method as recited in
3 claim 29.

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5 **41.** A deserialization method comprising:

6 parsing a message;

7 the message comprising a serialized object comprising:

8 a data structure ("datastruct") element having a pair of datastruct
9 tags encoded in XML, wherein the datastruct tags identify the datastruct;

10 contents of the datastruct between the datastruct tags, the contents
11 comprising one or more data parameter elements, each having a pair of
12 parameter tags associated therewith and encoded in XML, wherein each
13 pair of parameter tags identifies a parameter element with which the pair of
14 tags is associated, each parameter element having associated data between
15 the parameter tags
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1 42. A computer-readable storage medium having computer-executable
2 instructions that, when executed by a computer, performs a method of formatting a
3 message for exchange between entities on a network, the method comprising:

4 generating a data structure ("datastruct") element representative of a data
5 structure of a first object, the datastruct element having a pair of datastruct tags,
6 wherein the datastruct tags identify the datastruct element;

7 generating contents of the datastruct between the datastruct tags, the
8 contents comprising one or more data parameter elements representative of one or
9 more data parameters of the first object's data structure, each parameter element
10 having a pair of parameter tags associated therewith, wherein each pair of
11 parameter tags identifies a parameter element with which the pair of tags is
12 associated, each parameter element having associated data between the parameter
13 tags.

1 43. A computer-readable storage medium having computer-executable
2 instructions that, when executed by a computer, performs a method of exchanging
3 a message between entities on a network, the method comprising:

4 transmitting a message to an entity over a network;

5 the message comprising a serialized object comprising:

6 a data structure ("datastruct") element representative of a data
7 structure of an object, the datastruct element having a pair of datastruct
8 tags, wherein the datastruct tags identify the datastruct element;

9 contents of the datastruct between the datastruct tags, the contents
10 comprising one or more data parameter elements representative of one or
11 more data parameters of the object's data structure, each parameter element
12 having a pair of parameter tags associated therewith, wherein each pair of
13 parameter tags identifies a parameter element with which the pair of tags is
14 associated, each parameter element having associated data between the
15 parameter tags.

1 **44.** A computer-readable storage medium having computer-executable
2 instructions that, when executed by a computer, performs a method of parsing a
3 message received from an entity on a network, the method comprising:

4 parsing a message;

5 the message comprising a serialized object comprising:

6 a data structure ("datastruct") element representative of a data
7 structure of a first object, the datastruct element having a pair of datastruct
8 tags, wherein the datastruct tags identify the datastruct element;

9 contents of the datastruct between the datastruct tags, the contents
10 comprising one or more data parameter elements representative of one or
11 more data parameters of the object's data structure, each parameter element
12 having a pair of parameter tags associated therewith, wherein each pair of
13 parameter tags identifies a parameter element with which the pair of tags is
14 associated, each parameter element having associated data between the
15 parameter tags.
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1 **45.** An apparatus comprising:

2 a processor;

3 an object serializer executable on the processor to:

4 generate a data structure ("datastruct") element representative of a
5 data structure of a first object, the datastruct element having a pair of
6 datastruct tags, wherein the datastruct tags identify the datastruct element;

7 generate contents of the datastruct between the datastruct tags, the
8 contents comprising one or more data parameter elements representative of
9 one or more data parameters of the first object's data structure, each
10 parameter element having a pair of parameter tags associated therewith,
11 wherein each pair of parameter tags identifies a parameter element with
12 which the pair of tags is associated, each parameter element having
13 associated data between the parameter tags.

1 46. An apparatus comprising:
2 a processor;
3 a message transmitter executable on the processor to:
4 transmit a message to an entity over a network;
5 the message comprising a serialized object comprising:
6 a data structure ("datastruct") element representative of a data
7 structure of an object, the datastruct element having a pair of datastruct
8 tags, wherein the datastruct tags identify the datastruct element;
9 contents of the datastruct between the datastruct tags, the contents
10 comprising one or more data parameter elements representative of one or
11 more data parameters of the object's data structure, each parameter element
12 having a pair of parameter tags associated therewith, wherein each pair of
13 parameter tags identifies a parameter element with which the pair of tags is
14 associated, each parameter element having associated data between the
15 parameter tags.
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47. An apparatus comprising:

a processor;

a message parser executable on the processor to:

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parse a message;
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the message comprising a serialized object comprising:

a data structure (“datastruct”) element representative of a data structure of a first object, the datastruct element having a pair of datastruct tags, wherein the datastruct tags identify the datastruct element;

contents of the datastruct between the datastruct tags, the contents comprising one or more data parameter elements representative of one or more data parameters of the object's data structure, each parameter element having a pair of parameter tags associated therewith, wherein each pair of parameter tags identifies a parameter element with which the pair of tags is associated, each parameter element having associated data between the parameter tags.

48. A data structure for use with a computer having a processor and a memory, said structure comprising one or more data parameter elements, each parameter element having a pair of parameter tags associated therewith and encoded in XML, wherein each pair of parameter tags identifies a parameter element with which the pair of tags is associated, each parameter element having associated data between the parameter tags.

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1 **49.** A method of serializing an object, the method comprising:
2 storing a data structure of an object while preserving a hierarchical
3 arrangement and relationship of parameters within the data structure;
4 storing data associated with each parameter while preserving associations
5 of each parameter with the data;
6 storing references to one or more serialized objects.

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9 **50.** A method as recited in claim 49, wherein one or more of the
10 references is the object being serialized by the storing steps.
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